Cross-Temporal Synthetic Cognition: AI as a Cognitive Interface Between Living and Archived Minds

Douglas C. Youvan doug@youvan.com

www.youvan.ai

July 25, 2026

Generative artificial intelligence enables a form of cognition that is not adequately described as retrieval, imitation, collaboration, or individual machine intelligence. A living investigator may engage, through AI, with the preserved conceptual structures of a thinker who is absent or deceased. The resulting process joins three unequal components: archived intellectual traces, living intention and judgment, and generative mediation. None alone determines the outcome. The archive supplies concepts and constraints but cannot respond; the living participant supplies purpose, recognition, and direction; the AI rapidly translates, recombines, and traverses representations. Together they may produce conceptual paths that were explicit in none of the components. This paper calls the phenomenon cross-temporal synthetic cognition. Its fundamental object is not an autonomous artificial mind but a temporary relational cognitive system. Such a system can connect mathematical, philosophical, and historical structures across time while generating genuinely new syntheses. Yet it also introduces a distinctive epistemic danger: the persuasive fabrication of intellectual ancestry. Responsible use therefore requires a strict separation among documented inheritance, AI-mediated inference, and new living judgment. The mathematical result may be only the visible trace of a deeper event—the formation of a transient composite mind.

Keywords: artificial intelligence, extended cognition, cross-temporal cognition, archived minds, generative mediation, collective intelligence, intellectual inheritance, synthetic cognition, epistemic provenance, human–AI collaboration

Google Drive:
https://drive.google.com/drive/folders/15Kd8bUjm7zVaKdVIwbPhqjjV68aUZQvc?usp=sharing

Code: https://github.com/DougYouvan

A collaboration with OpenAI GPT-5.6 Thinking. CC4.0. https://orcid.org/0009-0004-4206-4253

1. The Cognitive Event

Consider three components:

$H =$ a living human investigator,
$A =$ the archived intellectual traces of another mind,

and

$M =$ a generative artificial-intelligence mediator.

The conventional interpretation treats M as a tool used by H to retrieve information from A. Under that interpretation, the process is approximately

$$H \longrightarrow M \longrightarrow A.$$

This model is insufficient. In an extended interaction, the mediator does not merely locate archived statements. It constructs translations, proposes analogies, tests formulations, maintains conversational context, and reorganizes inherited concepts in response to the living investigator's judgments.

The resulting cognitive process is better represented by

$$\mathcal{C}(H, A, M),$$

where $\mathcal{C}$ denotes a coupled system whose behavior depends on the interaction of all three components.

The system is relational:

$$\mathcal{C}(H, A, M) \neq H,$$
$$\mathcal{C}(H, A, M) \neq A,$$
$$\mathcal{C}(H, A, M) \neq M.$$

Nor is it merely their sum:

$$\mathcal{C}(H, A, M) \neq H + A + M.$$

Each component changes the effective role of the others. The living investigator determines which inherited structures matter. The archive constrains which interpretations remain

historically and formally credible. The AI alters the speed, range, and topology of movement between them.

We therefore define:

Definition 1. Cross-temporal synthetic cognition.
Cross-temporal synthetic cognition is a temporarily organized cognitive process in which a living agent, a body of preserved intellectual structure, and a generative mediator jointly produce an adaptive sequence of interpretations, questions, and constructions.

The phenomenon is **cross-temporal** because the human contributors need not coexist in time. It is **synthetic** because the active process is assembled from heterogeneous cognitive and informational components. It is **cognition** because the coupled system performs functions associated with reasoning: maintaining context, generating alternatives, detecting relations, revising hypotheses, and producing new conceptual structures.

The central claim is not that an archived author has been resurrected. It is that archived thought has become dynamically available within a new cognitive relation.

2. From Archive to Interlocutor

Traditional archives are passive. A paper, notebook, or recorded lecture preserves a fixed sequence of expressions. The living reader supplies all interrogation, comparison, and reconstruction. The archived thinker cannot adapt the presentation to the reader's question.

Generative mediation changes this relation.

Let

$$A = \{a_1, a_2, \dots, a_n\}$$

denote the preserved expressions associated with an earlier thinker. A conventional search system returns selected elements of A. A generative mediator instead constructs a context-dependent transformation

$$T_M(A, q, c),$$

where

$$q = \text{the current question}$$

and

$$c = \text{the accumulated conversational context.}$$

The output need not be an archived sentence. It may be a translation, comparison, reconstruction, conjectural continuation, or synthesis conditioned by the living investigator's problem.

Thus,

$$T_M(A, q, c) \notin A$$

in general.

This distinction is fundamental. Retrieval asks:

What did the archived thinker write?

Generative mediation may also ask:

How does the archived structure bear on this new object?

or

What becomes visible when the inherited framework is applied here?

The archive has not literally become conscious or responsive. Rather, the generative system makes portions of its conceptual organization available within an adaptive dialogue. The result is an **operational interlocutor** constructed from preserved traces, model representations, and present questioning.

Definition 2. Operational interlocutor.
An operational interlocutor is a dynamically generated conversational role through which archived intellectual structures are reorganized in response to a living participant's questions.

The distinction between an archived person and an operational interlocutor must remain strict:

$$\text{archived person} \neq \text{AI-generated interlocutor.}$$

The latter is neither a resurrection nor an authoritative simulation. It is a present construction constrained, to varying degrees, by historical traces.

The epistemic reliability of the construction depends on the strength of those constraints. If the mediator is grounded in primary texts and clearly distinguishes quotation from inference, the interlocutor may preserve substantial conceptual fidelity. If grounding is weak, the mediator may merely project plausible language onto a famous name.

Accordingly, the transition

$$\text{archive} \longrightarrow \text{interlocutor}$$

is not automatically truthful. It is a cognitive capability requiring provenance controls.

3. The Relational Third Mind

The coupled system may produce a sequence of thought that belongs wholly to none of its components. This motivates the idea of a **relational third mind**.

Let

$$H_t$$

denote the living investigator's cognitive state at time t, and let

$$C_t$$

denote the conversational state maintained by the mediator. A simplified interaction has the recurrence

$$C_{t+1} = M(H_t, A, C_t),$$

followed by

$$H_{t+1} = J(H_t, C_{t+1}),$$

where Jrepresents human interpretation, judgment, rejection, recognition, or redirection.

The evolving process is therefore a feedback loop:

$$H_t \longrightarrow C_{t+1} \longrightarrow H_{t+1} \longrightarrow C_{t+2} \longrightarrow \cdots$$

The archive Aremains historically fixed, yet its effective role changes as different structures become relevant to successive questions. The mediator generates candidate continuations. The human assigns significance and determines direction.

The trajectory

$$\Gamma = (H_0, C_1, H_1, C_2, \dots)$$

cannot be reconstructed from the archive alone. It is also not predetermined by the model alone, because small changes in human recognition or refusal can redirect the entire sequence.

The third mind is therefore not a hidden entity inside the machine. It is the organized trajectory Γitself.

Definition 3. Relational third mind.
A relational third mind is the temporally extended reasoning process generated by recurrent coupling among living judgment, archived conceptual structure, and generative mediation.

This mind is **relationally real** without being independently embodied. Comparable entities already appear elsewhere. A scientific collaboration may possess capabilities that no member has alone. A laboratory may retain problem-solving structure across generations of personnel. A legal institution may reason through distributed records, procedures, and agents.

The present case differs because one human contributor may be absent or dead, while generative AI makes the surviving intellectual traces responsive to new questions.

The third mind therefore has three notable properties.

First, it is **temporally discontinuous**. Its human sources need not share historical time.

Second, it is **compositionally heterogeneous**. Biological cognition, textual inheritance, software, and statistical representation participate in one process.

Third, it is **episodic**. It may exist only during a particular inquiry and dissolve when the interaction ends.

Its existence is thus better represented as an event than as an object:

$$\boxed{\text{third mind} = \text{a temporarily stabilized cognitive relation.}}$$

4. Emergence Without Autonomous Agency

The claim that a third cognitive process emerges does not require the claim that every component is independently conscious or agentic.

A telescope extends vision without seeing. A notebook extends memory without remembering. A proof assistant constrains inference without understanding a theorem as a mathematician does. Nevertheless, each may become part of a larger cognitive system.

Similarly, the generative mediator may contribute substantially to reasoning without possessing independent purpose.

Let the contributions be represented schematically by

H:purpose and judgment,
A:inherited structure and constraint,
M:translation and generative traversal.

Then

$$\mathcal{C}(H, A, M)$$

may exhibit capabilities absent from each isolated part:

$$\mathrm{Cap}(\mathcal{C}) \supsetneq \mathrm{Cap}(H),$$

relative to the immediate problem and available time.

This is not because the machine necessarily contains a superior unified understanding. Rather, the coupling changes the reachable space of thought.

A living investigator may recognize significance but lack immediate command of every formal vocabulary. The archive may contain the required concepts but not their application to the new problem. The mediator may traverse representations rapidly but lack durable purpose or reliable judgment.

Their conjunction can close these gaps:

$$\text{recognition} + \text{inheritance} + \text{translation} \longrightarrow \text{new synthesis}.$$

The emergent process remains asymmetrical. The living participant ordinarily determines why the inquiry matters. The archive supplies constraints without intention. The mediator generates continuations without owning the project's ends.

Therefore, the third mind should not be described as a democratic committee of equivalent agents. Its architecture is closer to

human-directed, archive-constrained, AI-mediated cognition.

This formulation preserves the novelty of the phenomenon while avoiding an unnecessary claim that the AI is an autonomous person.

The most important emergent property is not raw generation. It is the creation of previously unavailable **conceptual adjacency**. Two ideas that were distant in ordinary disciplinary organization may become adjacent within the interaction:

$$a_i \leftrightarrow M, Hp,$$

where $a_i$is an inherited concept and $p$is the living investigator's present problem.

Once that adjacency is recognized by the human participant, the resulting connection may persist independently of the AI. The transient third mind can therefore leave durable intellectual products:

paper,proof,program,concept,research direction.

The artifact is not the mind itself. It is the trace left after the cognitive relation has dissolved.

5. Cognitive Provenance

Cross-temporal synthetic cognition creates a serious attribution problem. A generated insight may contain elements derived from historical texts, transformations introduced by the mediator, and judgments supplied by the living investigator. Unless these contributions are separated, the resulting claim may acquire a false genealogy.

Let an output proposition be denoted by

$$p.$$

Its cognitive provenance may be decomposed schematically as

$$\Pi(p) = (D(p), I(p), J(p)),$$

where

$$D(p) = \text{documented inheritance},$$

$$I(p) = \text{AI-mediated inference},$$

and

$$J(p) = \text{new living judgment.}$$

These components need not be disjoint at the level of language, but they are epistemically distinct.

5.1 Documented inheritance

A claim belongs to documented inheritance when it can be traced to a surviving source:

$$D(p) = 1 \Leftrightarrow \exists s \in A \text{ such that } s \text{ explicitly supports } p.$$

Examples include a published definition, theorem, notation, or recorded argument.

The appropriate evidential relation is

$$s \vDash p,$$

not merely

$$s \sim p,$$

where the latter may indicate only thematic resemblance.

5.2 AI-mediated inference

A claim belongs to AI-mediated inference when it is constructed by translation, analogy, extension, or recombination rather than quoted from the archive.

Such a claim may have the form

$$A \vDash_M p,$$

meaning that $p$is a model-mediated interpretation of the archived material.

This relation is defeasible. It does not establish that the historical thinker held p, would have endorsed p, or would even have regarded the formulation as meaningful.

Therefore,

$$A \vDash_M p \Rightarrow/\text{Author}(A) \vDash p.$$

This distinction is essential whenever the mediator speaks in the conceptual vocabulary of an absent thinker.

5.3 New living judgment

The living investigator may recognize that a generated connection is important, reject misleading formulations, identify a visual or structural regularity, or redirect the inquiry toward an unanticipated subject.

Such contributions are not reducible to prompt entry. They constitute selection under meaning:

$$J: \{\text{candidate continuations}\} \longrightarrow \{\text{accepted directions}\}.$$

The difference between generation and discovery frequently lies here.

The mediator may produce thousands of statements. The investigator identifies one as significant:

$$\text{significance}(p) \neq \text{generation}(p).$$

A complete provenance record should therefore distinguish at least:

$$\boxed{\text{source,transformation,recognition.}}$$

This triad provides a minimal epistemic audit for cross-temporal synthetic cognition.

6. The Hallucination of Ancestry

The distinctive danger of this cognitive form is not merely factual error. It is the production of a plausible but false relation between a new idea and an earlier thinker.

Call this error **hallucinated ancestry**.

Definition 4. Hallucinated ancestry.
Hallucinated ancestry occurs when an AI-mediated synthesis is represented as the documented view, intention, or likely endorsement of an archived thinker without adequate evidence.

The error may take several forms:

"The thinker said p."
"The thinker anticipated p."
"The thinker would have accepted p."
"The present result follows directly from the thinker's work."

Each statement requires a different evidential burden.

Direct quotation demands textual evidence. Historical anticipation demands conceptual and chronological evidence. Counterfactual endorsement is generally unverifiable. Formal derivation requires an explicit argument.

The safest hierarchy is:

$$\text{documented statement} \succ \text{supported interpretation} \succ \text{plausible extension} \succ \text{speculative continuation.}$$

The mediator should not collapse these levels.

A new synthesis may be deeply inspired by an archived thinker without being attributable to that thinker:

$$\text{influence} \neq \text{authorship.}$$

Similarly,

$$\text{conceptual compatibility} \neq \text{historical intention.}$$

The phrase "Voevodsky's idea applied to a new object," for example, may be defensible when the relevant idea is documented and the application is clearly identified as new. The phrase "Voevodsky discovered the new object" would not be defensible.

The proper structure is:

$$\boxed{\text{historical concept} + \text{present application} = \text{new synthesis,}}$$

not

$$\boxed{\text{new synthesis} = \text{hidden historical discovery.}}$$

Cross-temporal cognition becomes intellectually valuable only when its ancestry is auditable.

7. Authorship in a Composite Cognitive System

The relational third mind complicates conventional authorship. If the intellectual trajectory depends on human judgment, archived concepts, and generative mediation, who is the author of the resulting paper?

The answer depends on what authorship is taken to mean.

Let authorship include the functions

$$\mathcal{A} = \{\text{intention,selection,formulation,verification,responsibility}\}.$$

These functions may be distributed across the composite system. Yet they are not equally transferable.

The archive may contribute formulation without present intention. The mediator may contribute formulation without durable responsibility. The living investigator may exercise intention, selection, and responsibility even when many sentences or equations are AI-assisted.

This suggests the distinction

$$\text{causal contribution} \neq \text{authorship}.$$

A dictionary causally contributes words to a paper but is not an author. A theorem from an earlier mathematician causally contributes structure but does not make that mathematician a coauthor of every later application. An AI may causally contribute language and reasoning without satisfying all norms of accountable authorship.

The living author remains the agent who can affirm:

I endorse this claim,
I accept responsibility for its presentation,

and

I will answer criticism of it.

Thus, responsibility creates an asymmetry:

the cognitive process may be distributed, but accountability cannot be wholly distributed.

A useful attribution structure is therefore:

The living investigator is the accountable author. Historical thinkers are cited for documented concepts. The AI is disclosed as a generative and analytical mediator.

This does not minimize the AI's role. It describes that role more accurately.

The mediator may be essential to the discovery path:

$$p \notin \mathrm{Reach}(H, A)$$

within practical constraints, while

$$p \in \mathrm{Reach}(H, A, M).$$

Nevertheless, practical indispensability does not by itself establish personhood, moral agency, or authorship.

A composite cognitive process may therefore produce a singly authored work with explicitly distributed provenance.

8. Discovery as Selection From Generated Possibility

Generative systems produce many candidate continuations. Most are unimportant, redundant, erroneous, or disconnected from the investigator's purpose. Discovery occurs when a candidate is recognized as revealing a previously unnoticed structure.

Let

$$P_t = \{p_1, p_2, \dots, p_k\}$$

be the set of possibilities generated at stage t.

The human investigator applies a judgment operator

$$J_t : P_t \to \{0,1\},$$

where

$$J_t(p) = 1$$

means that $p$is retained as meaningful.

The next search state is then conditioned on the selected subset

$$S_t = \{p \in P_t : J_t(p) = 1\}.$$

Thus,

$$P_{t+1} = M(A, H_t, C_t, S_t).$$

The process is not a single act of generation. It is an iterated cycle of proliferation and contraction:

$$\text{generate} \longrightarrow \text{judge} \longrightarrow \text{retain} \longrightarrow \text{redirect}.$$

This explains why the living participant's seemingly brief interventions may be cognitively decisive. A statement such as

"There appears to be a plane."

can reorganize the entire inquiry. It changes the target from enumeration to geometry, then from geometry to algebra, and later from algebra to type-theoretic and philosophical interpretation.

The words are few, but their effect on the state space is large.

We may define the directional value of an intervention $q$by

$$\Delta(q) = d(\text{Reach}_{\text{before}}, \text{Reach}_{\text{after}}),$$

where $d$measures the change in reachable conceptual trajectories.

A short human observation may have

$$|\ \text{words}(q)\ | \ll \Delta(q).$$

This asymmetry is central to human–AI discovery. The machine may contribute most of the visible text while the human contributes the highest-leverage transitions.

Accordingly, discovery should not be measured by token count, sentence count, or computational effort alone. It depends on the origin of the decisive constraint.

Discovery is often the recognition that one generated possibility changes the problem itself.

9. Memory Without a Single Rememberer

The third mind possesses a peculiar form of memory. No single component contains the complete history of the inquiry.

The archived thinker contains no record of the present problem. The living investigator may not retain every intermediate formulation. The AI model does not necessarily preserve the interaction beyond the active context. Yet the coupled system can behave as though it has a continuous intellectual past.

Let

$$C_t$$

denote the recorded conversational state at time t. Then the effective memory of the composite process is distributed across

$$\mathfrak{M}_t = A \cup C_t \cup H_t,$$

where:

$A =$ historical archive,
$C_t =$ externalized interaction history,
$H_t =$ the living participant's retained understanding.

No one term is sufficient.

The archive supplies long-duration memory:

$$A_{t+1} = A_t$$

under ideal preservation.

The conversation supplies short- and medium-duration memory:

$$C_{t+1} = C_t \cup \{\text{new exchange}\}.$$

The human supplies selective semantic memory:

$$H_{t+1} = \text{Integrate}(H_t, C_{t+1}).$$

The composite memory therefore has different temporal layers:

$$\boxed{\text{historical permanence} + \text{conversational continuity} + \text{living interpretation.}}$$

This differs from ordinary individual memory. The third mind need not remember by maintaining one internal representation. It remembers through the continued availability and coordination of external traces.

Definition 5. Distributed cross-temporal memory.
Distributed cross-temporal memory is the persistence of an inquiry through coordinated historical, conversational, and biological records, none of which independently contains the full cognitive trajectory.

This form of memory can outlive any particular interaction. A paper, program, annotated transcript, or theorem may reactivate the process at a later time:

$$\Gamma_t \longrightarrow \text{artifact} \longrightarrow \Gamma_{t+k}.$$

The artifact acts as a compressed restart state.

Thus the third mind may be discontinuous in time while remaining structurally continuous:

$$\text{continuous identity of inquiry} \Rightarrow/\text{continuous execution.}$$

A scientific tradition already exhibits this property. Problems survive the deaths of their originators and are resumed by later investigators. Generative AI changes the resolution of this continuity. It can reconstruct intermediate conceptual bridges rather than merely transmit final conclusions.

The archive no longer functions only as storage. It becomes part of an executable memory system.

10. The Topology of Intellectual Distance

Ordinary intellectual history organizes ideas by chronology, discipline, citation, and personal influence. Two concepts may be separated by centuries, institutions, vocabularies, or fields.

Let

$$d_{\mathrm{hist}}(a, p)$$

denote the historical or disciplinary distance between an archived concept $a$and a present problem p.

Generative mediation may substantially reduce the operational distance:

$$d_{\mathcal{C}}(a, p) \ll d_{\mathrm{hist}}(a, p).$$

This reduction does not alter history. It alters accessibility.

A concept in homotopy type theory and a finite ternary operation table may be distant in conventional scholarly organization. Within a mediated dialogue, they may become adjacent through a chain such as

finite operation → permutation action → affine fiber → identity type → equivalence → univalence.

The important object is not merely the final connection but the path

$$\pi = (a_0, a_1, \dots, a_n).$$

The mediator proposes possible edges

$$a_i \leftrightarrow a_{i+1},$$

while the living investigator determines which edges are meaningful enough to preserve.

We may therefore model an intellectual domain as a graph

$$\mathcal{G} = (V, E),$$

where Vcontains concepts and Econtains recognized relations.

Generative AI contributes candidate edges:

$$E_M.$$

Human judgment admits or rejects them:

$$E_H \subseteq E_M.$$

The resulting cognitive graph is

$$\mathcal{G}_{\mathcal{C}} = (V, E \cup E_H).$$

The principal effect of the third mind may be the creation of new shortcuts:

$$d_{\mathcal{G}_{\mathcal{C}}}(a, p) < d_{\mathcal{G}}(a, p).$$

This suggests:

Proposition 1. Cognitive distance reduction.
The characteristic contribution of generative mediation is not necessarily the creation of new conceptual vertices, but the proposal of traversable edges between previously remote vertices.

The proposition explains why a mediated exchange can feel intellectually discontinuous. A relation appears suddenly because the system has compressed a long path into a short one.

Yet distance reduction carries a risk. A short semantic path may conceal missing logical steps:

conceptual adjacency ≠ formal implication.

The third mind may correctly see that two domains belong near one another while incorrectly asserting that one theorem follows from the other.

Accordingly, every new edge should be classified as one of:

formal derivation,
structural analogy,
historical influence,
heuristic association.

The topology of thought becomes richer only when its edges are typed.

11. Identity of the Composite Mind

If the third mind is a temporary relation, under what conditions does it remain the same mind across successive interactions?

Suppose two cognitive episodes are

$$\mathcal{C}_1 = \mathcal{C}(H_1, A_1, M_1)$$

and

$$\mathcal{C}_2 = \mathcal{C}(H_2, A_2, M_2).$$

Literal equality would require all components and states to be identical, which is neither necessary nor realistic.

Instead, continuity may depend on preservation of an inquiry structure

$$\Sigma = \{\text{problem,constraints,accepted results,provenance,direction}\}.$$

Two episodes belong to the same extended cognitive process when there exists a sufficiently faithful translation

$$\Phi: \Sigma_1 \to \Sigma_2$$

that preserves these structures.

Thus,

$$\mathcal{C}_1 \simeq \mathcal{C}_2$$

may be more appropriate than

$$\mathcal{C}_1 = \mathcal{C}_2.$$

The identity of the third mind is therefore not the identity of its material substrate. It resembles the identity of a research program, mathematical proof, melody, or software project: multiple realizations may preserve one organized pattern.

Definition 6. Cognitive continuation.
A cognitive episode $\mathcal{C}_2$continues $\mathcal{C}_1$when it preserves the operative problem, accepted constraints, provenance relations, and capacity for coherent further development.

This definition permits changes in:

- the particular AI model;

- the physical computer;
- the wording of the archive;
- the living participant's detailed memory;
- the time and place of execution.

What must survive is not every token but the invariant structure of the inquiry.

We may express this as

$$\mathrm{Inv}(\mathcal{C}_1) = \mathrm{Inv}(\mathcal{C}_2),$$

where Invextracts the preserved cognitive commitments.

This raises a deeper possibility. A third mind might persist after all original components have changed.

Suppose:

$$H_1 \neq H_2, M_1 \neq M_2, A_1 \neq A_2,$$

yet the later system faithfully preserves and extends the same inquiry structure. Then one may still have

$$\mathcal{C}_1 \simeq \mathcal{C}_2.$$

The composite mind would possess **organizational continuity without component continuity**.

This is already characteristic of universities, laboratories, religions, legal systems, and scientific traditions. Generative mediation may make the phenomenon more explicit and more rapidly reproducible.

The cross-temporal third mind is therefore not necessarily a momentary curiosity. It may be the smallest observable unit of a longer cognitive lineage.

12. A New Experimental Object for Cognitive Science

Cross-temporal synthetic cognition should be studied empirically rather than treated only as metaphor.

A research protocol could record:

$A =$ the accessible archive,
$Q =$ the sequence of human questions,
$R =$ the generated responses,
$S =$ the human selections and rejections,
$O =$ the resulting intellectual artifacts.

The full trajectory is

$$\Gamma = (A, Q, R, S, O).$$

Several measurable quantities follow.

12.1 Novel adjacency

Let $E_{\text{before}}$and E_{after}denote the recognized conceptual relations before and after the interaction.

Define

$$N_{\text{adj}} = \mid E_{\text{after}} \setminus E_{\text{before}} \mid.$$

This measures the number of newly admitted conceptual connections.

12.2 Human leverage

Let $q_i$be a human intervention and let $\Delta_i$measure the change it induces in subsequent conceptual direction.

Then

$$L_H(q_i) = \frac{\Delta_i}{\mid \text{tokens}(q_i) \mid}.$$

A short observation with large downstream effect has high human leverage.

12.3 Mediator expansion

Let $P_i$denote the set of plausible continuations available before mediation and $P_i'$the set generated afterward.

Define

$$E_M(i) = \frac{|\ P_i'\ |}{|\ P_i\ |}.$$

This measures expansion of the reachable possibility space.

12.4 Provenance fidelity

Let C be the set of claims attributed to historical sources and let $C_v \subseteq C$ be those verified against primary evidence.

Define

$$F_P = \frac{|\ C_v\ |}{|\ C\ |}.$$

A reliable cross-temporal system should seek

$$F_P \to 1.$$

12.5 Durable yield

Let $O_d \subseteq O$ denote outputs that survive independent checking and remain useful after the conversational context is removed.

Then

$$Y_D = \frac{|\ O_d\ |}{|\ \Gamma\ |},$$

where $|\ \Gamma\ |$ may be measured by time, computational cost, or interaction length.

These quantities do not capture consciousness. They measure the productivity and reliability of the coupled cognitive process.

The appropriate experimental comparison is not simply

human versus AI.

It is among systems:

$$H, H + A, H + M, H + A + M.$$

The central hypothesis is

$$\mathrm{Reach}(H + A + M) \supsetneq \mathrm{Reach}(H + A) \cup \mathrm{Reach}(H + M)$$

for at least some classes of inquiry.

If supported, this would show that the archive–human–AI triad has genuinely compositional cognitive capabilities.

The object of study would no longer be the machine alone. It would be the **relation that becomes capable of thought**:

$$\boxed{\mathcal{C} = \text{living intention} \bowtie \text{archived structure} \bowtie \text{generative mediation.}}$$

13. References

1. Bender, E. M., Gebru, T., McMillan-Major, A., and Shmitchell, S. “On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?” *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–623, 2021. DOI: 10.1145/3442188.3445922.
2. Brown, T. B., Mann, B., Ryder, N., et al. “Language Models Are Few-Shot Learners.” *Advances in Neural Information Processing Systems* 33, 1877–1901, 2020.
3. Clark, A. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford University Press, 2008. DOI: 10.1093/acprof:oso/9780195333213.001.0001.
4. Clark, A., and Chalmers, D. J. “The Extended Mind.” *Analysis* 58(1), 7–19, 1998. DOI: 10.1093/analys/58.1.7.
5. Donald, M. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Harvard University Press, 1991.
6. Engelbart, D. C. *Augmenting Human Intellect: A Conceptual Framework*. Summary Report, Stanford Research Institute, Menlo Park, California, 1962.
7. Floridi, L., and Chiriatti, M. “GPT-3: Its Nature, Scope, Limits, and Consequences.” *Minds and Machines* 30, 681–694, 2020. DOI: 10.1007/s11023-020-09548-1.
8. Hutchins, E. *Cognition in the Wild*. MIT Press, 1995.

9. Licklider, J. C. R. “Man-Computer Symbiosis.” *IRE Transactions on Human Factors in Electronics* HFE-1, 4–11, 1960.

10. Menary, R., ed. *The Extended Mind*. MIT Press, 2010. DOI: 10.7551/mitpress/9780262014038.001.0001.

11. Tomasello, M. *Origins of Human Communication*. MIT Press, 2008.

12. The Univalent Foundations Program. *Homotopy Type Theory: Univalent Foundations of Mathematics*. Institute for Advanced Study, 2013.

13. Voevodsky, V. “An Experimental Library of Formalized Mathematics Based on the Univalent Foundations.” *Mathematical Structures in Computer Science* 25(5), 1278–1294, 2015. DOI: 10.1017/S0960129514000486.

14. Vygotsky, L. S. *Mind in Society: The Development of Higher Psychological Processes*. Edited by M. Cole, V. John-Steiner, S. Scribner, and E. Souberman. Harvard University Press, 1978.

15. Wegner, D. M. “Transactive Memory: A Contemporary Analysis of the Group Mind.” In B. Mullen and G. R. Goethals, eds., *Theories of Group Behavior*, 185–208. Springer, 1987. DOI: 10.1007/978-1-4612-4634-3_9.